WE CLAIM:

1. A telecommunication system comprising:

a transmitter at a site configured to modulate a first RF carrier with a first set of data;

a receiver at said site configured to demodulate a second set of data from a second RF carrier;

an orthomode transducer having at least two linear ports and a circular waveguide port, one of said linear ports connected as an input from said transmitter and another of said linear ports simultaneously connected as an output to said receiver;

an antenna; and

a linear-to-circular polarizer connected to said circular waveguide port and connected to said antenna, said linear-to-circular polarizer configured so that a first linear polarization at said circular waveguide port results in a first circular polarization at said antenna and a second circular polarization at said antenna results in a second linear polarization at said circular waveguide port.

2. The telecommunication system of claim 1 further comprising:

a second transmitter at a second site configured to modulate said second RF carrier with said second set of data;

a second receiver at said second site configured to demodulate said first set of data from said first RF carrier;

a second orthomode transducer having at least two second linear ports and a second circular waveguide port, one of said second linear ports connected as an input from said second transmitter and another of said second linear ports simultaneously connected as an output to said second receiver;

a second antenna; and

a second linear-to-circular polarizer connected to said second circular waveguide port and connected to said second antenna, said second linear-to-circular polarizer configured so that said second linear polarization at said second circular waveguide port results in said second circular polarization at said second antenna and said first circular polarization at said second antenna results in said first linear polarization at said second circular waveguide port.

3. The telecommunication system of claim 1 wherein said first RF carrier and said second RF carrier have the same frequency.

4. The telecommunication system of claim 1 wherein said first RF carrier at said site has said first circular polarization and said second RF carrier at said site has said second circular polarization.

5. The telecommunication system of claim 1 wherein said first circular polarization is LHCP and said second circular polarization is RHCP.

6. The telecommunication system of claim 1 wherein said first circular polarization is RHCP and said second circular polarization is LHCP.

7. The telecommunication system of claim 1 wherein said first linear polarization is horizontal and said second linear polarization is vertical.

8. The telecommunication system of claim 1 wherein said first linear polarization is vertical and said second linear polarization is horizontal.

9. A cross polarization interference canceller comprising:

a transmit splitter adapted for splitting a transmit signal between a forward link and said cross polarization interference canceller;

a receive splitter adapted for splitting a receive signal from a return link;

an interference detector connected to said transmit splitter and connected to said receive splitter and configured to correlate said transmit signal and said receive signal to determine an interference with said receive signal due to said transmit signal and to output an interference amplitude and interference phase of said interference;

a vector modulator controller configured to use said interference amplitude and interference phase output of said interference detector to calculate new vector modulator settings;

a vector modulator connected to said transmit splitter and connected to said vector modulator controller, said vector modulator configured to use said transmit signal from said transmit splitter and said new vector modulator settings from said vector modulator controller to form an interference cancellation vector; and

a summer connected to said vector modulator and connected to said receive splitter, said summer configured to form a clean receive signal by adding said interference cancellation vector from said vector modulator to said receive signal from said receive splitter, said summer adapted to provide said clean receive signal to a receiver.

10. The cross polarization interference canceller of claim 9 wherein said interference cancellation vector substantially cancels said interference with said receive signal due to said transmit signal when said interference cancellation vector is added to said receive signal.

11. The cross polarization interference canceller of claim 9 wherein said transmit signal and said receive signal have the same frequency.

12. The cross polarization interference canceller of claim 9 wherein said forward link and said return link are transmitted on a same channel.

13. The cross polarization interference canceller of claim 9 wherein said transmit signal propagates over said forward link with a first circular polarization and said receive signal propagates over said return link with a second circular polarization.

14. The cross polarization interference canceller of claim 13 wherein said first circular polarization is LHCP and said second circular polarization is RHCP.

15. The cross polarization interference canceller of claim 13 wherein said first circular polarization is RHCP and said second circular polarization is LHCP.

16. A telecommunication system comprising:

a transmitter at a first site configured to modulate a first RF carrier with a first set of data to form a transmit signal;

a receiver at said first site configured to demodulate a second set of data from a second RF carrier forming a receive signal;

an orthomode transducer having at least two linear ports and a circular waveguide port, one of said linear ports connected as an input from said transmitter and another of said linear ports simultaneously connected as an output to said receiver;

an antenna;

a linear-to-circular polarizer connected to said circular waveguide port and connected to said antenna, said linear-to-circular polarizer configured so that a first linear polarization at said circular waveguide port results in a first circular polarization at said antenna and a second circular polarization at said antenna results in a second linear polarization at said circular waveguide port; and

a cross polarization interference canceller comprising:

a transmit splitter adapted for splitting said transmit signal between said orthomode transducer and said cross polarization interference canceller;

a receive splitter adapted for splitting said receive signal from said orthomode transducer;

an interference detector connected to said transmit splitter and connected to said receive splitter and configured to correlate said transmit signal and said receive signal to determine an interference with said receive signal due to said transmit signal and to output an interference amplitude and interference phase of said interference;

a vector modulator controller configured to use said interference amplitude and interference phase output of said interference detector to calculate new vector modulator settings;

a vector modulator connected to said transmit splitter and connected to said vector modulator controller, said vector modulator configured to use said transmit signal from said transmit splitter and said new vector modulator settings from said vector modulator controller to form an interference cancellation vector, wherein said interference cancellation vector substantially cancels interference on said receive signal from said transmit signal when said interference cancellation vector is added to said receive signal; and

a summer connected to said vector modulator and connected to said receive splitter, said summer configured to form a clean receive signal by adding said interference cancellation vector from said vector modulator to said receive signal from said receive splitter, wherein said summer provides said clean receive signal to said receiver.

17. The telecommunication system of claim 16 further comprising a second transmitter and a second receiver at a second site, said second transmitter and said second receiver configured to communicate with said first receiver and said first transmitter at said first site.

18. A method comprising steps of:

modulating a first RF carrier with a first set of data to form a transmit signal wherein said modulating is performed by a transmitter;

demodulating a second set of data from a second RF carrier forming a receive signal, wherein said demodulating is performed by a receiver;

simultaneously using one linear port of an orthomode transducer having at least two linear ports as an input from said transmitter and another linear port of said orthomode transducer as an output to said receiver while using a circular waveguide port of said orthomode transducer as input and output to a channel;

converting a first linear polarization at said circular waveguide port to a first circular polarization in said channel and converting a second circular polarization in said channel to a second linear polarization at said circular waveguide port;

splitting said transmit signal between said orthomode transducer and a cross polarization interference canceller;

splitting said receive signal from said orthomode transducer;

feeding said transmit signal and said receive signal to an interference detector and using said interference detector to correlate said transmit signal and said receive signal to determine an interference with said receive signal due to said transmit signal and to output an interference amplitude and interference phase of said interference;

inputting said interference amplitude and interference phase to a vector modulator controller to calculate new vector modulator settings;

supplying said new vector modulator settings to a vector modulator and using said transmit signal and said new vector modulator settings from said vector modulator controller to form an interference cancellation vector, wherein said interference cancellation vector substantially cancels interference with said receive signal due to said transmit signal when said interference cancellation vector is added to said receive signal;

using a summer to add said interference cancellation vector from said vector modulator to said receive signal to form a clean receive signal; and

providing said clean receive signal to said receiver whereby cross polarization interference is substantially cancelled.

19. The method of claim 18 wherein said first RF carrier and said second RF carrier have the same frequency.

20. The method of claim 18 wherein said converting step is performed by a linear-to-circular polarizer.

21. The method of claim 18 wherein said channel is accessed using an antenna.

22. The method of claim 20 wherein said linear-to-circular polarizer is connected to an antenna.

23. The method of claim 18 wherein said first circular polarization is RHCP and said second circular polarization is LHCP.

24. The method of claim 18 wherein said first circular polarization is LHCP and said second circular polarization is RHCP.

25. The method of claim 18 wherein said first linear polarization is horizontal and said second linear polarization is vertical.

26. The method of claim 18 wherein said first linear polarization is vertical and said second linear polarization is horizontal.

27. The method of claim 18 wherein said first linear polarization and said second linear polarization are orthogonal to each other.